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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO.
09/197,767	11/23/1998	HISASHI OHTANI	0756-1896	1677

22204 7590 06/18/2003

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EXAMINER	
CAO, PHAT X	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/197,767	OHTANI ET AL.	
	Examiner	Art Unit	
	Phat X. Cao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,9,10,15,16,22-27,40 and 46-74* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9,10,15,16,22-27,40 and 46-74* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *33*
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. The Request for Continued Examination filed 5/6/03 in Paper No. 31 is acknowledged.

Claim Rejections - 35 USC § 112

2. Claims 1-4, 51-54, 55-58, 59-62 and 63-66 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Claims 55-58 and 63-66 recites the limitation "said medium" in line 1. There is insufficient antecedent basis for this limitation in the claim.

- In independent claims 1-4, "an embedded conductive layer provided to fill said contact hole, ... , wherein the embedded conductive layer comprises a conductive material dispersed in a medium," is unclear. It is unclear because what is a different between "said contact hole" and "a medium"?

- Dependent claims 51-54 and 59-62, "said medium" is unclear because of the same reason as set forth in independent claims 1-4.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 47, 51, 55, 59, 63, 67-68 and 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US. 5,536,950) in view of Fukunaga et al (US. 5,706,064).

With respect to claims 1, 47, 51, 55, 59, and 63, Liu et al disclose in Fig. 4G a semiconductor device comprising: a transistor; at least one interlayer insulating film 78 formed over the transistor, the interlayer insulating film 78 having a contact hole; an embedded conductive layer 82 provided to fill the contact hole wherein a top surface of the embedded conductive layer 82 is flush with a top surface of the interlayer insulating film 78; and a reflective pixel electrode TM2 (column 5, lines 37-39) formed on the interlayer insulating film 78 wherein the reflective pixel electrode TM2 is electrically connected to the transistor through the embedded conductive layer 82.

Liu et al do not disclose the embedded conductive layer 82 being made from the materials as claimed.

However, Fukunaga et al, in Fig. 17, teach that the embedded conductive layer 411b is made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column 20, lines 36-48) or polymer (column 26, lines 54-61). Accordingly, it would have been obvious to form Liu's embedded conductive layer with the materials as set forth above, because such

materials would provide a color liquid crystal display devices having high speed response, low power consumption, and low prices, as taught by Fukunaga et al (column 3, lines 30-34).

With respect to claims 67-68 and 71-72, Fukunaga et al (Fig. 17) further teach the obviousness of forming an embedded conductive layer 411b comprising a same resin as the resin of the interlayer insulating film 413 (see column 19, lines 27-35 and column 42, lines 50-52), wherein the embedded conductive layer 411b comprises an organic resin film containing a conductive material dispersed therein or an inorganic film containing a conductive material disperse therein (column 41, lines 22-32).

5. Claims 2, 22-27, 40, 48, 52, 56, 60 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al in view of Yamazaki (US. 5,990,542) and Fukunaga et al.

With respect to claims 2, 48, 52, 56, 60, and 64, as discussed above, Fig. 4G of Liu et al substantially reads on the claimed invention, except that it does not disclose the interlayer insulating film 78 comprising an organic resin.

However, Yamazaki teaches in Fig. 2B the obviousness of forming the interlayer insulating film 120 made of organic resin (column 5, lines 65-67). Accordingly, it would have been obvious to form the interlayer insulating film 78 of Liu et al with an organic resin, because according to Yamazaki, the interlayer insulating film made of the organic resin would suppress an electric field from the pixel electrode created later from being disturbed (column 6, lines 1-6).

Neither Liu nor Yamazaki discloses the embedded conductive layer being made from the materials as claimed.

However, Fukunaga et al, in Fig. 17, teach that the embedded conductive layer 411b is made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column 20, lines 36-48) or polymer (column 26, lines 54-61). Accordingly, it would have been obvious to form Liu's embedded conductive layer with the materials as set forth above, because such materials would provide a color liquid crystal display devices having high speed response, low power consumption, and low prices, as taught by Fukunaga et al (column 3, lines 30-34).

With respect to claims 22-27 and 40, Fukunaga et al also teach in column 1, lines 5-30 that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to one ordinary skill in the art to apply the display device of Fukunaga et al to a display device of a cellular phone, a camcoder, etc., because it is an intended use.

6. Claims 3, 22-27, 40, 49, 53, 57, 61, 65, 69-70, and 73-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (US. 6,081,305) in view of Okita (US. 6,097,453) and Fukunaga et al.

With respect to claims 3, 49, 53, 57, 61, and 65, Sato et al disclose in Fig. 2 a semiconductor device comprising: a transistor; a first interlayer insulating film 130 formed over the transistor; a drain electrode 141 formed on the first interlayer insulating film and electrically connected to a drain of the transistor through an opening of the first interlayer insulating film; a

second interlayer insulating film 150 formed over the drain electrode and the first insulating film; a capacitor forming electrode 165 formed on the second interlayer insulating film 150 to form a capacitor between the drain electrode 141 and the capacitor forming electrode 165; a third interlayer insulating film 170 formed over the capacitor forming electrode and the second interlayer insulating film; contact holes 171 and 151 opened through the third and second interlayer insulating films to reach the drain electrode; an embedded conductive layer filled in the contact holes; and a reflective pixel electrode 181 is electrically connected to the drain electrode through the embedded conductive layer.

Sato et al do not disclose that the contact holes 171 and 151 are formed as a single contact hole opened through the third and second insulating films.

However, Okita teaches in Fig. 6 the obviousness of forming a single contact hole 508 opened through the third insulating film 109 and second insulating film 601 to reach the drain electrode 108. Accordingly, it would have been obvious to modify the contact holes 171 and 151 of Sato et al by forming a single contact hole, because as is well known, the forming of a single contact hole as taught by Okita would reduce the number of steps in fabricating process.

Neither Sato nor Okita discloses the embedded conductive layer being made from the materials as claimed.

However, Fukunaga et al, in Fig. 17, teach that the embedded conductive layer 411b is made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column

20, lines 36-48) or polymer (column 26, lines 54-61). Accordingly, it would have been obvious to form Sato's embedded conductive layer with the materials as set forth above, because such materials would provide a color liquid crystal display devices having high speed response, low power consumption, and low prices, as taught by Fukunaga et al (column 3, lines 30-34).

With respect to claims 22-27 and 40, Fukunaga et al also teach in column 1, lines 5-30 that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to one ordinary skill in the art to apply the display device of Fukunaga et al to a display device of a cellular phone, a camcoder, etc., because it is an intended use.

With respect to claims 69-70 and 73-74, Fukunaga et al (Fig. 17) further teach the obviousness of forming an embedded conductive layer 411b comprising a same resin as the resin of the interlayer insulating film 413 (see column 19, lines 27-35 and column 42, lines 50-52), wherein the embedded conductive layer 411b comprises an organic resin film containing a conductive material dispersed therein or an inorganic film containing a conductive material disperse therein (column 41, lines 22-32).

7. Claims 4 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al in view of Okita and Yamazaki (US. 5,990,542).

As discussed in details above, the combination of Sato et al and Okita substantially reads on the claimed invention, including the known feature of forming a material normally used for

the electrode (i.e., pixel electrode) in the semiconductor and TFT processes, such as aluminum (as taught by Okita, in column 6, lines 15-19).

The above combination does not disclose the third interlayer insulating film comprising an organic resin.

However, Yamazaki teaches in Fig. 2B the obviousness of forming the ITO pixel electrode on the interlayer insulating film 120 made of organic resin (column 5, lines 65-67). Accordingly, it would have been obvious to form the interlayer insulating film 170 of Sato et al with an organic resin, because according to Yamazaki, the interlayer insulating film made of the organic resin would suppress an electric field from the pixel electrode created later from being disturbed (column 6, lines 1-6).

8. Claims 54, 58, 62 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al, Okita and Yamazaki as applied to claim (4,50) above, and further in view of Fukunaga et al.

None of the above references discloses the embedded conductive layer being made from the materials as claimed.

However, Fukunaga et al, in Fig. 17, teach that the embedded conductive layer 411b is made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column 20, lines 36-38) or polymer (column 26, lines 54-61). Accordingly, it would have been obvious to form Sato's embedded conductive layer with the materials as set forth above, because such

materials would provide a color liquid crystal display device having high speed response, low power consumption, and low prices, as taught by Fukunaga et al (column 3, lines 30-34).

9. Claims 5, 16, 22-27, 40 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al in view of Fukunaga et al (US. 5,706,064).

With respect to claims 5 and 46, as discussed above, Fig. 4G of Liu et al substantially reads on the claimed invention, except it does not disclose that the embedded conductive layer comprises a same resin as the resin of the interlayer insulating film.

However, Fukunaga et al teach in Fig. 17 the obviousness of forming an embedded conductive layer 411b comprising a same resin as the resin of the interlayer insulating film 413 (see column 19, lines 27-35 and column 42, lines 50-52), wherein the embedded conductive layer 411b comprises an organic resin film containing a conductive material dispersed therein or an inorganic film containing a conductive material disperse therein (column 41, lines 22-32). Accordingly, it would have been obvious to form the embedded conductive layer and the interlayer insulating film with the resin as set forth above, in order to provide a substrate for a display device which can be used in liquid crystal in a high speed response mode and achieves a low price, such as taught by Fukunaga et al (column 1, lines 55-59).

With respect to claim 16, Fukunaga et al further teach that the embedded conductive layer 411b is made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column 20, lines 36-48) or polymer (column 26, lines 54-61), and one of the two

conductive layers is in contact with an alignment film 517 (number 517 not shown in Fig. 17, see Fig. 27).

With respect to claims 22-27 and 40, Fukunaga et al also teach in column 1, lines 5-30 that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to one ordinary skill in the art to apply the display device of Fukunaga et al to a display device of a cellular phone, a camcoder, etc., because it is an intended use.

10. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (US. 5,990,542) in view of Jun (US. 5,948,705).

Yamazaki discloses in Fig. 2B a semiconductor device comprising: a transistor; at least one interlayer insulating film 120 comprising an organic resin formed over the transistor, the interlayer insulating film 120 having a contact hole; a conductive layer 121 made of ITO formed on the interlayer insulating film wherein the conductive layer 121 extends into the contact hole and electrically connected to the transistor.

Yamazaki does not disclose a metal electrode formed on the conductive layer as claimed.

However, Jun teaches in Fig. 4E the obviousness of forming a metal electrode 48 on the embedded conductive layer 47, wherein at least one peripheral edge of the metal electrode 48 is coextensive with a peripheral edge of the embedded conductive layer 47. Accordingly, it would have been obvious to modify the conductive structure of Yamazaki by forming a metal electrode

with the structures as set forth above for improving step coverage and for preventing a recess formation in the contact hole, such as taught by Jun (column 7, lines 35-41).

11. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki and Jun as applied to claim 6 above, and further in view of Fukunaga et al (US. 5,706,064).

Neither Yamazaki nor Jun disclose the conductive layer comprising carbon dispersed in an organic or comprising a material selected from the group consisting of Zinc oxide, aluminum flakes and nickel flakes.

However, Fukunaga et al teach the obviousness of forming the embedded conductive layer 411b made of inorganic oxide conductive layer of ITO or ZnO (column 5, lines 66-67 through column 6, lines 1-3) or made of organic conductive layer of carbon (column 20, lines 36-37) or polymer (column 26, lines 54-61). Accordingly, it would have been obvious to form the embedded conductive layer with the materials as set forth above, in order to provide a substrate for a display device which can be used in liquid crystal in a high speed response mode and achieves a low price, such as taught by Fukunaga (column 1, lines 55-59).

12. Claims 1-2, 5, 22-27, 40, 47-48, 51-52, 55-56, 59-60, 63-64, 67-68 and 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al (US. 5,706,064) in view of Liu et al (US. 5,536,950).

With respect to claims 1-2, 5, 47-48, 51-52, 55-56, 59-60,63-64, 67-68 and 71-72, Fukunaga (Figs. 24A - 24G) discloses a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer (413,414)

over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer 405 at a bottom of the opening; forming an embedded conductive layer 418 to cover the insulating layer and the opening (Fig. 24E); etching the embedded conductive layer 418 (Fig. 24F); and forming a second conductive layer on the insulating layer and the embedded conductive layer; and forming a light reflective pixel electrode 412 by patterning the second conductive layer (column 26, lines 46-48); wherein the reflective pixel electrode 412 is electrically connected to the transistor through the embedded conductive layer 418 or 411b, wherein the embedded conductive layer 418 or 411b comprises an organic resin film made of polymer (column 26, lines 54-61) or carbon (column 20, lines 36-48) which is the same resin as the resin of the interlayer insulating film (column 19, lines 27-35 and column 20, lines 31-57), and wherein the embedded conductive layer 418 or 411b is further made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3).

Fukunaga does not disclose the top surface of the embedded conductive layer being flush with the top surface of the interlayer insulating film.

However, Liu (Fig. 4G) teaches the steps of depositing the embedded conductive layer 82 in the opening, followed by planarization to flush the top surface of the embedded conductive layer with the top surface of the interlayer insulating film 78, and depositing and patterning the pixel electrode 24 on the embedded conductive layer 82 (column 5, lines 30-39). Accordingly, it would have been obvious to form the embedded conductive layer 418 of Fukunaga being flush

with the top surface of the interlayer insulating film in order to provide a unique body tie arrangement for achieving a compact and high reliability display, as taught by Liu (column 2, lines 57-67 through column 3, lines 1-12).

With respect to claims 22-27 and 40, Fukunaga also teaches that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to apply the display device of Fukunaga to a cellular phone, a camcorder, etc., because it is an intended use.

Response to Arguments

13. Applicant's arguments with respect to the claimed invention have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (703) 308-4917. The Examiner can normally be reached on Monday through Thursday. If attempts to reach the Examiner by telephone are unsuccessfully, the Examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. Group 2800 fax number is (703) 308-7722 or (703) 308-7724.

PC
June 13, 2003

PHAT X. CAO
PRIMARY EXAMINER